

REMARKS

Claims 1-58 are presently pending in the application. Claims 11-14 and 23-50 are withdrawn from consideration.

Claim 1 has been amended to recite that the percentages are weight percentages and to recite that Cd and Pb are not intentionally included in the alloy composition, which is supported in the specification at least in paragraph [0005]. Claims 1 and 3-58 have also been amended to delete the word “type.” No new matter has been added by these amendments, and entry is respectfully requested. Further, these amendments should overcome the § 112, second paragraph rejections of the claims as being indefinite with regard to “%” and “type,” and withdrawal of the rejections are respectfully requested.

The Examiner argues that the application contains claims directed to five patentably distinct species: (1) thin type fuses; (2) cylindrical type fuses; (3) case type fuses; (4) radial type fuses; and (5) substrate type fuses, and requires that Applicant elect one species for initial examination. The Examiner acknowledges that claims 1-10 and 15-22 are generic. Applicant hereby confirms the election made orally on January 19, 2006 to prosecute the invention of species (2), cylindrical case fuses, recited in the claims 51-58. Accordingly, claims 11-14 and 23-50 are withdrawn from consideration.

Double Patenting Rejections

The Examiner has rejected claims 1-6 on the ground of obviousness-type double patenting as being unpatentable over claim 2 of U.S. Patent No. 6,819,215, and has rejected claims 1, 3, and 5 on the ground of obviousness-type double patenting as being unpatentable over claims 2 of U.S. Patent No. 6,911,892. In support of these rejections, the Examiner argues that the claimed and prior art ranges are close enough that one skilled in the art would have expected the resulting alloy compositions to have the same properties. The Examiner has also provisionally rejected claims 1-10, 15-22 and 51-58 on the ground of obviousness-type double patenting as being unpatentable over claims 31 and 55 of co-pending Application No. 10/656,561, arguing that the claimed and prior art compositions overlap with each other.

While not agreeing with the Examiner's conclusions, Applicant files herewith a Terminal Disclaimer and Statement of Common Ownership with respect to the '215 and '892 patents and

the '561 application. Accordingly, withdrawal of the double patenting rejections is respectfully requested.

Prior Art Rejections

In the Office Action, the Examiner has rejected claims 1, 3, and 5 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,280,629 of Kliewer ("Kliewer") and by JP 2003-034831 ("JP '831"). The Examiner has also rejected claims 1-6 under 35 U.S.C. § 102(b) as being anticipated by each of JP 63-262438 ("JP '438"), JP 63-266035 ("JP '035"), JP 63-266034 ("JP '034"), and JP 63-270437 ("JP '437"), collectively "the primary references". Further, claims 7-10 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over any of the primary references in view of JP 11-40025 ("JP '025") and JP 11-306940 ("JP '940"), and claims 15-18 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over any of the primary references in view of GB 2028608 ("GB '608"). The Examiner has further rejected claims 19-22 under 35 U.S.C. § 103(a) as being unpatentable over any of the primary references in view of JP '025 and JP '940 and further in view of GB '608, and claims 51-54 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over any of the primary references in view of JP '025 and JP 40-3110732 ("JP '732"). Finally, claims 55-58 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over any of the primary references in view of JP '025 and JP '940 and further in view of JP '732. Applicants respectfully traverse these rejections and the arguments in support thereof as follows, and respectfully request reconsideration and withdrawal of the rejections.

Rejection Under § 102(b) Based on Kliewer

Regarding claims 1, 3, and 5, the Examiner argues that Kliewer teaches a material having the claimed alloy composition, noting that the "thermal fuse element" limitation is merely an intended use and is not given patentable weight. Further, the Examiner takes the position that the indicator rod of Kliewer would be an alloy type thermal fuse element because it is an element that fuses due to changing temperature conditions. Applicants respectfully traverse this rejection as follows.

The presently claimed invention is directed to a material for an alloy type thermal fuse element and an alloy type thermal fuse containing such a fuse element which are both designed

to meet requirements for environmental conservation which prohibit the use of materials harmful to a living body (see, for example, paragraph [0005] of the present application). Accordingly, the presently claimed alloy compositions contain specific concentrations of In, Bi, and Sn, but do not intentionally contain Pb or Cd.

In contrast, Kliewer teaches a device to be used when cooking which produces a signal when a predetermined temperature is achieved. The device is inserted into a food, such as a turkey to be roasted. When the food and device reach the appropriate temperature, the “fusible latch element” in the device melts, releasing an indicator rod and permitting a spring to move the rod to an extended signal position (Kliewer col. 3, lines 53-63). This device does not function as an alloy type thermal fuse as claimed, which opens an electric current following melting of the fuse element alloy caused by an abnormally high level of heat which is generated in an appliance.

Furthermore, the alloy composition of Kliewer which the Examiner argues overlaps the claimed composition is a composition containing 21% In, 12% Sn, 49% Bi, and 18% Pb (col. 4, lines 3-8), which is explicitly excluded from the presently claimed compositions. In fact, all four of the exemplary compositions of Kliewer contain Pb, and two of them contain Cd. Therefore, there would have been no motivation based on Kliewer to exclude such elements from the alloy compositions. Finally, the composition of Kliewer is taught to have an operating temperature of 136°F (57.8°C), in contrast with the operating temperature of the presently claimed fuse elements of 75-120°C (see paragraphs [0055] – [0056] of the present application).

For all of these reasons, Kliewer does not teach or suggest all of the claimed elements and thus does not anticipate the present claims. Reconsideration and withdrawal of the § 102(b) rejection are respectfully requested.

Rejection Under § 102(b) Based on JP '831

Regarding claims 1, 3, and 5, the Examiner argues that in the abstract and in alloys B2, H6 and H7, JP '831 teaches alloy type thermal fuses which the claimed alloy compositions, and thus anticipates the claims. Applicant respectfully traverses this rejection as follows.

The December 13, 2002 filing date of JP 2002-361701, to which the present application claims priority, is prior to the February 7, 2003 filing date of JP '831. Enclosed herewith is a

verified English translation of JP 2002-361701. Since at least claims 1, 3 and 5 are supported in the priority document, JP '831 is not prior art against the present application, and withdrawal of the § 102(b) rejection is respectfully requested.

Rejections Under § 102(b) Based on JP '438, JP '035, JP '034, and JP '437

Regarding claims 1 and 2, the Examiner argues that each of the four cited references ("the primary references") teaches fuses having the claimed alloy compositions which would inherently be sensitive to temperature and thus qualify as alloy type thermal fuses. Applicants respectfully traverse these rejections as follows.

The primary references teach alloy compositions as shown in the following Table:

Alloy Compositions Taught by Primary References

	<u>JP '438 (Ex. 17)</u>	<u>JP '034 (Ex. 5)</u>	<u>JP '035 (Ex. 18)</u>	<u>JP '437 (Ex. 5)</u>
In	20 %	20 %	20 %	20 %
Sn	8 %	8 %	8 %	8 %
Bi	45 %	45 %	45 %	45 %
Cd	5 %	5 %	5 %	5 %
Al			0.5 %	0.5 %
Cu		2 %		2 %
Ag	2 %		2 %	
Pb	balance (20%)	balance (20%)	balance (19.5%)	balance (19.5%)

It can be seen that all of the primary references teach alloy compositions containing significant amount of both Cd (5%) and Pb (19.5-20%), which are both harmful to living bodies and are explicitly excluded from the presently claimed alloy compositions.

Further, Applicant respectfully traverses the Examiner's conclusion that the prior art alloys would qualify as alloy type thermal fuses. To the contrary, the primary references teach conductors for fuses. These conductors function by instantaneously breaking a wire when an

overload current which is over a rated current is applied. Such “current fuses” thus blow out by the Joule heat of the overload current, thereby opening an electric circuit. In contrast, in thermal fuses, as in the presently claimed invention, the fuse element alloy melts when an abnormally high level of heat is generated in the electrical appliance, thereby opening an electric current. The primary references do not teach thermal fuses and the fuses described therein would also not function as thermal fuses as claimed.

Finally, JP ‘034 teaches at page 2 that:

In a conductor for a fuse according to the present invention, Cu is 0.01 to 2 wt% and the balance is at least one or more low-melting fusible metal... In the alloy composition in which Cu is more beyond (or more than) 2 wt%, the temperature wherein the liquid phase has been established is beyond 700° C. In other words, it is beyond a melting temperature which is appropriate for a fuse conductor.

Similarly, JP ‘437 teaches at page 2 that:

In a conductor for a fuse element according to the present invention, Al is 0.01 to 2 wt%, Cu is 0.01 to 2 wt%, and the balance is at least one ore more low-melting fusible metal.... In the alloy composition in which Cu is more beyond (or more than) 2 wt%, the temperature wherein the liquid phase has been established is beyond 700° C. In other words, it is beyond a melting temperature which is appropriate for a fuse conductor.

JP ‘034 and ‘437 thus teach away from including greater than 2 wt% Cu in the alloy compositions, because the resulting operating temperatures will be beyond 700°C. In contrast, in the claimed alloys, even when the concentration of Cu is greater than 2 wt% (and may be as high as about 3.4 wt%), the operating temperature of the resulting fuse is 75°C to 120°C (see paragraphs [0055] and [0056] of the application).

For all of these reasons, none of the primary references teaches or suggests all of the claimed elements and thus none of the references anticipates the pending claims. Accordingly, reconsideration and withdrawal of the § 102(b) rejections are respectfully requested.

Rejections Under § 103(a) Based on JP ‘438, JP ‘035, JP ‘034, and JP ‘437 in view of JP’025, JP ‘940, GB ‘608, and/or JP ‘732

Regarding claims 7-10, the Examiner acknowledges that the primary references do not teach that the fuse elements are connected between lead conductors or that at least a portion of

each lead conductor is covered with a Sn or Ag film. However, the Examiner concludes that it would have been obvious to have modified the alloys of the primary references to connect a fuse element between a pair of lead wires because JP '025 allegedly teaches a fuse element with a similar composition which is connected between a pair of lead wires. Further, the Examiner concludes that it would have been obvious to modify the alloys of the primary references to apply an Sn or Ag film to the surface of the lead conductors, since JP '940 allegedly teaches that the application of such films improves bonding strength.

Regarding claims 15-22, the Examiner acknowledges that the primary references do not specify providing a heating element for fusing off the fuse elements. However, GB '608 allegedly teaches providing a resistor to blow a thermal fuse in order to terminate heating in a heating circuit for an electric blanket. Therefore, the Examiner concludes that it would have been obvious to have modified the primary references by providing a resistor to blow a thermal fuse in order to terminate heating in a heating circuit.

Finally, regarding claims 51-58, the Examiner acknowledges that the primary references do not specify that lead conductors are bonded to ends of the fuse element, a flux is applied to the fuse element, the flux-applied fused element is passed through a cylindrical case, gaps between ends of the ceramic tubing and the lead conductors are sealingly closed, that the ends of the lead conductors have a disk-like shape, and that ends of the fuse elements are bonded to front faces of the disks. However, the Examiner contends that these limitations are taught by JP '025 or JP '732, and thus concludes that it would have been obvious to modify the fuses of the primary references to add these features. Applicants respectfully traverse all of these rejections as follows.

As previously explained, none of the primary references teaches or suggests all of the elements of independent claim 1, namely, an alloy type thermal fuse having a specific alloy composition which does not intentionally contain Pb or Cd. Further, these elements are also not taught by the secondary references cited by the Examiner. For example, JP '025 teaches an alloy-type thermal fuse having an alloy composition containing Bi, Cd, Sn and In. JP '940 relates to a thin metallic film which may be provided on the surface of lead wires. Further, JP '732 teaches an alloy temperature fuse with a specific structure, and GB '608 relates to heating circuits and is completely silent as to alloy thermal fuses. Accordingly, none of the secondary

references cures the deficiencies with the primary references, and even the proposed combinations of references would not teach or suggest all of the claimed elements. Therefore, reconsideration and withdrawal of the § 103(a) rejections are respectfully requested.

In view of the preceding Amendments, Remarks, and Terminal Disclaimer, it is respectfully submitted that the pending claims are fully in compliance with § 112, patentably distinct from the prior art of record, and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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Encl: Terminal Disclaimer and Transmittal
Verified English Translation of JP 2002-361701